



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,830	12/22/2005	Ryotaro Hayashi	SHIGA7,040APC	5909
20995 7590 05/14/2010 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614				
EXAMINER				
EOFF, ANCA				
ART UNIT		PAPER NUMBER		
1795				
NOTIFICATION DATE		DELIVERY MODE		
05/14/2010		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
efiling@kmob.com
eOAPilot@kmob.com

Office Action Summary

Application No.

10/561,830

Applicant(s)

HAYASHI ET AL.

Examiner

ANCA EOOF

Art Unit

1795

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17, 22 and 24-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17, 22 and 24-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Art Unit: 1795

DETAILED ACTION

1. Claims 17, 22 and 24-28 are pending. Claims 1-16, 18-21 and 23 have been cancelled.
2. The foreign priority documents JP 2003-189707 filed on July 01, 2003 and JP 2004-119498 filed on April 14, 2004 were received and acknowledged. However, in order to benefit of the earlier filing dates, certified English translations are required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

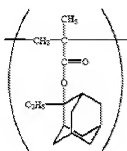
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 17, 22 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujishima et al. (US Patent 6,239,231) in view of Hada et al. (WO 03/048863, wherein the citations are from the English equivalent US Pg-Pub 2004/0058269).

With regard to claim 17, Fujishima et al. disclose a chemical amplifying positive resist composition comprising a resin, an acid generator (abstract) and a solvent (column 9, lines 1-15).

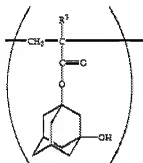
The resin may comprise units (Ia), units (II) and units (IV)(column, lines 14-16), wherein the units are represented by the formulas:

Art Unit: 1795



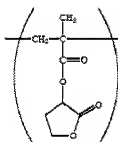
(Ia)

(column 3, lines 50-60);



(II)

(column 2, lines 55-65), and

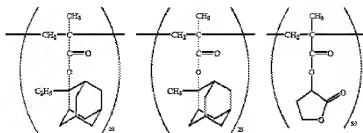


(IV)

(column 3, lines 25-35).

Fujishima et al. also teach that unit (Ia) has a group cleaved by the action of an acid and other units having groups cleaved by acid may be present in the resin (column 5, lines 56-59).

Fujishima et al. specifically disclose the resin of formula (I):



(I) (Resin I in columns 15-16), which has two units with acid-cleavable groups.

The resin (I) comprises:

- a first unit of 2-ethyl-2-adamantyl methacrylate which is equivalent to the unit (a1) of the instant application;
- a second unit of 2-methyl-2-adamantyl methacrylate which is equivalent to the unit (a2) of the instant application, as shown in the copolymer (A) on page 29 of the specification, and
- a third unit equivalent to the unit (a3) containing a lactone group of the instant application.

Fujishima et al. further teach that the resins used for the positive resist composition may also comprise units of 3-hydroxy-1-adamantyl (meth)acrylate (see column 2, lines 13-18, column 3, lines 11-13), which are equivalent to the unit (a4) of the instant application.

Additionally, Fujishima et al. teach that the polymerization units of 3-hydroxy-1-adamantyl (meth)acrylate (units (a4) of the instant application) in combination with α -methacryloyloxy- γ -butyrolactone (unit (a3) of the instant application) contribute to the improvement of the resolution of the resist (column 5, lines 43-46).

Fujishima et al. do not specifically teach a copolymer comprising units (a1), (a2), (a3) and (a4). However, it would have been obvious to one of ordinary skill in the art to obtain such polymer, based on the teachings of Fujishima et al. regarding the units forming the copolymer.

Fujishima et al. teach that the units having groups cleaved by the action of an acid are present in an amount of 30-80 mol% (column 6, lines 23-26), which encompasses the range for units (a1) and (a2) of the instant application.

Fujishima et al. teach that the α -methacryloyloxy- γ -butyrolactone unit may be present in an amount of 20- 70 mol% (column 6, lines 36-39), which encompasses the range for the unit (a3) of the instant application.

Fujishima et al. teach that the 3-hydroxy-1-adamantyl (meth)acrylate unit may be in amount of 20% or more (column 6, lines 41-43), which overlaps the range for unit (a4) of the instant application.

However, Fujishima et al. do not teach that the copolymer may comprise the unit (a5) of the instant application.

Hada et al. disclose a chemically amplified positive type resist composition comprising a resin (A) (par.0012), which may be the copolymer comprising:

- (a1) a unit derived from a (meth)acrylate ester comprising an acid dissociable, dissolution inhibiting group comprising a polycyclic group;
- (a2) a unit derived from a (meth)acrylate ester comprising a lactone group;
- (a3) a unit derived from a (meth)acrylate ester comprising a hydroxyl group containing polycyclic group, and

Art Unit: 1795

- (a4) a unit derived from a (meth)acrylate ester comprising a polycyclic group (par.0012).

Hada et al. further teaches that by incorporating each of the units (a1) to (a4), the resin enables an improvement in the depth of focus of an isolated resist pattern, reduction in the proximity effect and as result enables formation of a resist pattern which is faithful to the mask pattern, for both sparse and dense patterns (par.0017).

The unit (a1) of the Hada et al. is equivalent to the first and second units of the resin (I) of Fujishima et al.

The unit (a2) of Hada et al. is equivalent to the third unit of the resin (I) of Fujishima et al.

The unit (a3) of Hada et al. is equivalent to the 3-hydroxy-1-adamantyl (meth)acrylate unit of Fujishima et al.

The resins of Fujishima et al. comprise the units (a1) to (a3) of Hada et al.

Therefore, one of ordinary skill in the art would be motivated to add a unit (a4) of Hada et al. to the resin of Fujishima et al., in order to obtain a resin which enables an improvement in the depth of focus of an isolated resist pattern, reduction in the proximity effect and as result enables formation of a resist pattern which is faithful to the mask pattern, for both sparse and dense patterns (Hada et al, par.0017).

The unit (a4) of Hada et al. is equivalent to the unit (a5) of the instant application. Hada et al. further teaches that the unit (a4) may be present in the

Art Unit: 1795

resin in an amount of 10-20 mol% (par.0040), which is within the range for the unit (a5) of the instant application.

With regard to claim 22, Fujishima et al. disclose that the solvent used for the resist composition may be propylene glycol monomethyl ether acetate (PGMEA), ethyl lactate, γ -butyrolactone or a combination thereof (column 9, lines 1-15). Fujishima et al. specifically disclose a mixture of PGMEA and γ -butyrolactone (column 18, line 67 -column 19, line 1).

With regard to claim 24, Fujishima et al. disclose that the acid generator may be diphenyliodonium trifluoromethanesulfonate (column 6, line 66), which is equivalent to the onium salt with a fluorinated alkylsulfonate anion used as acid generator (B) of the instant application.

With regard to claim 25, Fujishima et al. disclose that the chemical amplifying positive resist composition comprises nitrogen-containing organic compounds, such as amines (column 8, lines 9-56).

With regard to claim 26, Fujishima et al. disclose a process comprising the steps of:

- applying the resist composition to a substrate to form a resist film;
- drying the resist film,
- exposing for patterning;
- performing a heat-treatment, wherein the heat-treatment is equivalent to the post-exposure bake of the instant application, and
- developing with an alkali developer (column 9, lines 16-19).

Art Unit: 1795

With regard to claims 27-28, Fujishima et al. disclose that the heat-treatment (post-exposure bake) of the resist composition takes place at temperatures between 80°C and 120°C (see Table 1 in column 18 and Table 2 in column 19). This range overlaps the preferred range of 90-120°C of the instant application, as taught on page 26 of the specification.

The first and the second repeating units of the polymer (I) are equivalent to the units (a1) and (a2) of the copolymer of the instant application (see component (A) on page 29 of the specification).

Therefore, absent a record to the contrary, it is the examiner's position that the heating temperature during the post-exposure bake meets the limitation of claim 27.

Response to Arguments

5. Applicant's arguments with respect to the amended claims 17, 22 and 24-28, see the Remarks filed on May 03, 2010 have been considered but are moot in view of the new grounds of rejection.
6. The Declaration under 37 CFR 1.132 filed on December 02, 2009 is insufficient to overcome the rejection of claim 17 based upon Fujishima et al. (US Patent 6,239,231) in view of Hada et al. (WO 03/048863, wherein the citations are from the English equivalent US Pg-Pub 2004/0058269) because: the Declaration does not show unexpected results of the composition the instant application when compared the composition of the closest prior art of record- Fujishima et al. (US Patent 6,239,231).

Art Unit: 1795

The specification of the instant application does not show any example using the resin of Fujishima et al.

Fujishima et al. specifically teaches the resin (I) above (a resin comprising the units (a1), (a2), (a3)) and further provide strong motivation to include a unit (a4).

The closest Example to Fujishima et al. is Comparative Example 3.

The Declaration shows resin (A)-3', which comprises (a1), (a2), (a3) and (a4) (see Table A on page 3). This resin is used in the Comparative Example 3 (see Table B) on page 4).

The Comparative Test Example 3 leads to an exposure dose of 14 mJ/cm², line width of iso pattern on 150.6 nm and difference between target size and actual size of 30.6.

These results are comparable to the result given by the photoresist compositions of the instant application, for the following reasons:

- The exposure dose of 14 mJ/cm² is between the exposure dose values for Test Example 1 (20 mJ/cm²) and Test Example 3 (10 mJ/cm²). Test Example 1 uses polymer (A)-1 and Test Example 3 uses polymer (A)-3, which meet all the limitations for the copolymer (A1) of claim 17.

- The value of line width of iso pattern is 150.6 is very close to the value of 148.5 of Test Example 2.

- The value for the difference between target size and actual size is 30.6 and is very close to the value of 28.5 obtained in Test Example 2 .

Art Unit: 1795

Test Example 2 uses resin (A)-2, which meets all the limitations for the copolymer (A1) of claim 17.

Additionally, the applicant describes the results of Test Example 2 as excellent (see page 6 of the Declaration).

Therefore, the results in Comparative Test Example 3 (the closest example to Fujishima et al.) do not show *unexpected results* of the composition of the instant application.

The examiner would also like to show that Hada et al. specifically teach that by having the units (a1), (a3), (a4) and (a5) in a copolymer, the formation of a resist pattern which is faithful to the mask pattern, for both sparse and dense patterns is possible(par.0017). This feature is equivalent to a lower value of the difference between target size and actual size of the instant application.

In view of Hada et al., the feature of a small value for the difference between target size and actual size is not considered unexpected.

Conclusion

7. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory

Art Unit: 1795

action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. E./

Examiner, Art Unit 1795

/Cynthia H Kelly/

Supervisory Patent Examiner, Art Unit 1795